NORTHROP GRUMMAN

Central Montana Interoperable Communications Consortium

Interoperable Communications Plan Needs Assessment

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1 Introduction

1.1 Purpose of Document

This document is the final deliverable for the first phase of the Central Montana Interoperable Communication Consortium's Interoperable Communications Project. The document was written to show both the process and results of the phase. It contains all information necessary to allow the reader to determine why the project was undertaken, what activities were performed during the project, and what the results of the project were.

Throughout this document, the Central Montana Interoperable Communication Consortium may be referred to as the CMICC or "the consortium."

The Northrop Grumman Corporation site in Helena, Montana is pleased to present this to the Board Members of the consortium. It has been our pleasure to work with the consortium members and stakeholders.

1.2 Format of Document

The document is divided into the following sections:

- Section 1, *Introduction* (this section) provides the reader with information about this document.
- Section 2, *Executive Summary*, provides an overview of the results of this phase of the project.
- Section 3, *Background*, discusses the background for the project, from a historical, statewide perspective, as well as its motivations, goals, and purpose.
- Section 4, *Project Activities* details the activities that took place during this phase of the project.
- Section 5, *Detailed Results* contains a record of the results from this project phase.
- Section 6, Appendices contains several appendices with detailed information from the project.

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2 Executive Summary

2.1 Results

The Central Montana Interoperable Communication Consortium is comprised of the following jurisdictions:

- Cascade County
- Chippewa Cree Tribe
- Chouteau County
- Fergus County
- Judith Basin County
- Pondera County
- Teton County

In June of 2005, the Central Montana Interoperable Communications Consortium (CMICC) contracted with Northrop Grumman to conduct a needs assessment for the Interoperable Communications Project. This report is the conclusion of this phase of the project and presents findings, recommendations and supporting data. Key to the report and findings is the strategy for moving forward with the project.

The CMICC is strategically located between the now live concept demonstration project (CDP1) that was completed for Lewis and Clark County and the Northern Tier (CDP2), which is in the implementation phase of the project. Both systems are trunked, hybrid systems deploying a Motorola Smartzone Trunking Control system. The CMICC can take advantage of this system both from a radio coverage standpoint and from the trunking system infrastructure that is already in place for the two other projects.

Based on the needs assessment conducted over the period of July through October 2005, it appears that the best solution to improve interoperable communication for the CMICC is to bridge the gap between the two concept demonstration projects with the expansion of the wide area trunked system. This is directly in line with both the strategy adopted by the state Project Directors group and the definition for interoperability established by the SIEC.

A wide area trunking system provides a solution for the identified needs of the consortium, which include improvements to the following areas:

- Coverage
- Interoperability between agencies and other counties
- Dispatch procedures
- Frequency utilization

The needs assessment meetings had immediate impact in almost all locations. Having all of the stakeholders in the same room to discuss interoperability triggered ideas, which then were implemented after leaving the meeting. These changes included activities such as programming additional frequencies into radios to improve interoperability, arranging for memorandums of understanding, frequency planning and formalized communication plans.

Needs assessments statewide have had a similar impact. Focus has been brought to interoperable communication issues, and this focus has generated passionate debates on solutions. Though at times the discussions may be uncomfortable, they bring out valid points for discussion. It is critical that this feedback be considered when designing a new system.

The organizational bodies, from the SIEC, to the Project Directors group have come together to become more effective organizations. Again, this has seemed painful in ways, but it is a critical step in the evolution of the leadership necessary for interoperable communication in the state.

The following graph reflects responder priorities for communication improvements consortium wide. Stakeholders are calling for improved coverage, improved business practices, better paging and improved equipment. During follow up meetings, stakeholders provided further indication that the results shown here are accurate and what they would have expected.

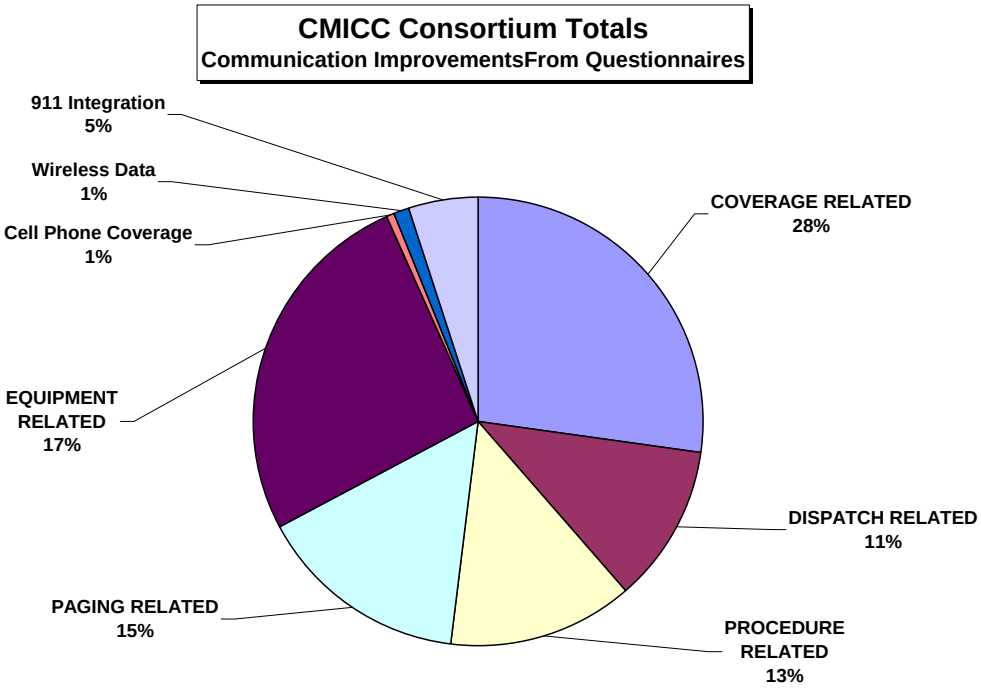

Figure 1 – Communications Improvements - Consortium Wide

2.2 Recommendations and Strategy

The recommendations and strategy described in this document are intended to be in alignment with the SIEC definition of interoperable communication. The exact definition can be found on the document CD and at the following web site:

http://www.discoveringmontana.com/itsd/policy/councils/SIEC/docs/SIEC_I_O_Def_tech_req.dot

Overall project success depends on the ability to demonstrate success on an iterative basis throughout the life of the project. Project tracking and reporting to show where success has occurred will build support for the project, not only stakeholder support, but also financial support.

Working collaboratively within the consortium and with others throughout the state will bring about the most effective plan, design and implementation of a system, not only for the CMICC but also for the other consortia and the state/region as a whole.

The following sections of this Executive Summary list the more critical aspects of the project as identified by agencies interviewed.

Note: *This section is a high-level summary of recommendations. For additional detail and a full list of recommendations, see section 5.5.*

2.2.1 Funding and Resources

It is critical for the success of this project that additional funding and resources be identified and pursued. Funding is near the top of the list of concerns for every agency in the CMICC. At the time of this writing, the project has only one primary revenue source: DES managed ODP Grants through Homeland Security. Additional funds and resources would allow for further work into various steps of the strategy.

There is definite concern throughout the consortium regarding how the available 2005 ODP funding will be allocated. This concern has presented itself with various agencies feeling that they have certain needs that need to be addressed before others in the consortium. This will need to be handled at the consortium board level and will not be easy to manage. Additional funding would make this easier to manage.

It will be beneficial for all to look at this aspect of the project in a different way as it progresses into the next phases. Everyone has something to contribute, not just funding. Some counties or agencies may be able to contribute to site improvements, others may have a great site already, which will contribute to the overall system. Still others may have frequencies or equipment that can be reallocated to benefit another agency. There has been excellent cooperation shown throughout Montana in recent months demonstrating this type of collaboration.

2.2.2 Coverage

Six of the seven jurisdictions interviewed indicated that radio coverage in their region needs improvement. The Chippewa Cree and Chouteau County have the benefit of a great radio site for coverage in their areas. Centennial and Highwood Baldy may be two of the best sites in the state as far as what they cover.

Nearly everyone in the consortium can benefit from the coverage from these two sites. The local sites in each jurisdiction provide good coverage for most areas, but improvements are needed nearly everywhere. These improvements can be made through trunking existing sites, which will allow a radio to select the best repeater site given its location in relation to the sites. In other places, additional sites or repeaters at existing sites need to be added.

2.2.3 Equipment

Everyone in the consortium needs upgrades to equipment of some sort. Some members are in better shape than others are, but all need more equipment. The strategy described in this document may help to guide the consortium in the decision making process that will more than likely be based on available funding.

2.2.4 System Design Considerations

Feedback from stakeholders in the consortium was heard loud and clear regarding fundamental aspects of the system design. There is virtually a consensus on the following priorities for communication improvements as this project moves forward:

- Affordable
- Simple to use
- Maintainable
- Reliable

2.2.5 Business Process, Training and Dispatch

Business process and dispatch process were identified by many stakeholders as a priority for a new communications system. As part of the implementation plan, the consortium should make sure that specific training is provided to all levels of radio users on:

- Radios
- Procedures
- Dispatch
- Trunking

Dispatch is a central aspect to radio communications and can be a bottleneck in communications when multiple incidents are being managed. This topic has been included in the process and training section as many of the problems that occur with dispatch can be addressed through business practices and training on those practices.

Dispatch can also benefit from the technology being proposed as has been demonstrated by the CDP1 project in Lewis and Clark County. By establishing business process such that tactical communication is handled on non-dispatch talkgroups, dispatch is freed up to focus on issues that require their attention. This is both a technological and procedural solution that will need to be worked in the following stages of this project.

2.2.6 Board of Project Directors

The statewide consortium project directors are providing leadership for the statewide effort. This group has demonstrated the ability to come together with a common goal to drive the statewide effort forward.

The Project Directors Board has adopted both a statewide implementation strategy and the concept of statewide project management to move this project forward.

This group needs to continue its work to formalize procedures for how different consortia work together to establish a statewide implementation plan. Collaboration is the key to success and will maximize the benefits from dollars spent.

2.3 Preliminary Design

The system implementation will have to be taken in phases unless a significant revenue source is found. In order to allow for different funding options, an overall strategy has been adopted by the Project Directors. This strategy is broken down into two sections: field units and site development.

Phase 1: Set the Stage - Radios and Site Upgrades
This stage of the project is to ensure that basic standards are met in regard to site conditions and capabilities, which will make sites “microwave ready”. It is also the stage for upgrading certain radios, both repeaters and field units.

Phase 2: Add Trunked Sites at each County Seat and Tribal Headquarters
The second stage adds microwave and trunking capabilities to sites overlooking counties seats, which are significant population centers, as well as dispatch centers.

Phase 3: Upgrade Additional Sites to Trunking Where Needed

This stage is where the system will go if the consortium has the funding necessary to build out a system that will satisfy the needs of everyone involved.

2.3.1 Field Unit Upgrade Strategy

The adopted strategy for upgrades to field units is based on the incident command structure and has been adopted by the Board of Project Directors. The primary funding source requires P25 Trunking capable units be purchased with grant funding, it makes sense for command and control level users be provided with new units first. Those radios would be classified as Category 1 radios.

The categorization of radio capability will help to prioritize and budget for upgrades. Category 2 radios would be P25 capable, Category 3 would be narrow band capable and all older radios that are wide band only would be set to Category 4.

The consortium in conjunction with local agencies will develop a deployment strategy based on the Incident Command Structure. The "Trickle Down Strategy", or resource reallocation strategy, will be used to re-deploy serviceable category 3 or 2 radios until all radios are at least up to Category 3. This will ensure that all radios become narrow band in time for the changes that will be mandated by the FCC.

2.3.2 Site Upgrade Strategy

Replace or upgrade sites to a certain level of standard that would include:

- Proper grounding
- Tower structural integrity
- Backup power capabilities
- Building capacity and environmentals

Site upgrades are selected based on coverage, current fundamental site conditions: power, building, tower, etc. The goal is to select sites that can fit together in a trunked system with overlapping coverage. Certain sites will remain conventional based on need and available funding. The upgrade plan leverages CDP1 and CDP2 infrastructure by adding repeaters to the existing sites to improve coverage and interoperability in all counties in the consortium.

This work will be centralized through project and frequency management to ensure that what one consortium is building works with another consortium where possible. Centennial, Belgian Hill, Kings Hill and several other sites border, or reach well into other consortia. Other sites located in bordering consortia may very well allow for increased coverage into the CMICC region.

2.4 Risks

There really are only two factors that present significant risk to the project:

- Lack of funding
- Lack of stakeholder buy-in and commitment

Obviously funding is key to this project moving forward. The Homeland Security Grants are the primary source of funding, but other sources of funding need to be found.

Lack of stakeholder buy in is not a significant problem, but it has the potential for high impact if it were to wane. As is the case with any project, stakeholder buy in is fundamental for the success of the project.

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3 Background

3.1 Historical Perspective – Other Similar Projects and Consortia

Montanans have always had the need for close communication, cooperation, and collaboration between their Law Enforcement and Emergency Responder agencies. The emergency situations the state can and has faced include natural disasters such as forest fires and earthquakes (the most recent large one in 1959 at a magnitude of 7.3), as well as manmade disasters such as the 1996 train derailment in Alberton Gorge (and subsequent poisonous chlorine gas release) and the 1988 train derailment and explosion in Helena (when it was 30 below zero). In each situation, Montana's Emergency Responders have had to communicate and coordinate in order to react effectively to these emergencies and meet the needs of their citizens. While our emergency responders have always been successful at this, roadblocks have, at times, gotten in the way. Sometimes these roadblocks are technological ("My radio can't talk to your radio") and sometimes they are procedural and political ("That's not our procedure in this situation," or "That's not our policy,").

After the terrorist attacks of September 11, 2001, agencies in these communities and throughout the state and nation have felt an even greater need to develop and maintain plans of cooperation and coordination. Part of this effort has been to work toward the interoperability of the communications equipment used throughout each region and the entire state. Additionally, this effort has included revisiting, renewing, revising, and sometimes creating agreements of understanding and cooperation between the various stakeholder agencies.

More recently, everyone has been reminded of radio system failures such as was experienced in New Orleans with hurricane Katrina. New Orleans police and fire systems quickly lost communications as they lost backup generators in the ensuing floodwaters. Systems relied heavily on a few common simplex frequencies similar to Montana's Mutual Aid channels. These channels were quickly overwhelmed. Different systems were not connected and caused a lack of interoperability.

Often, the challenges of communications interoperability have been met through "home-grown" efforts, almost on a case-by-case basis. In many cases, the interoperability is good. Historically, however, communication problems are usually listed among the top five problems in post-incident reviews, which suggest that there is room for improvement.

The majority of Montana's existing public safety voice radio systems rely on 30 year old technology. During 1996 – 99, the Warner Group and Spectrum Resources, Inc. each conducted as assessment of the public safety radio needs in Montana. System concepts and designs were completed by both groups with both studies concluding that development should proceed as a

natural outgrowth of existing relationships and processes. No implementation was undertaken with the concept and design of either of these plans.

To address and help remedy these situations, various entities within the State of Montana have been formed. The State of Montana began an effort in this regard at the state level several years back. Recently, Lewis & Clark County conducted a successful pilot interoperability project (the Concept Demonstration Project 1, or CDP1) to coordinate services between emergency responders. This project established direction and infrastructure for the county, as well as demonstrated the technology and ability to implement interoperability across agencies – state, local, federal, and private. The Northern Tier Interoperability Consortium (NTIC), which consists of twelve Montana counties and four Indian nations, was formed to deal with these same issues. NTIC initiated the Northern Tier Interoperability Project (NTIP), adopted the same directions and infrastructure decisions made by Lewis & Clark County.

The SIEC made the decision to adopt the directions and strategy established by Lewis & Clark County and the NTIC as the definition of statewide interoperability. Both projects have demonstrated the ability for diverse agencies to cooperate and succeed.

Part of the solution to the problems of interoperability is something called the Project 25 standard. Project 25 (P25) is a set of guidelines developed by radio system users for the purpose of standardizing the method of designing radio telecommunications networks for public safety agencies. Agencies such as the Association of Public Safety Communications Officials (APCO), the National Association of State Telecommunications Directors (NASTD), the Telecommunications Industry Association (TIA), the International Association of Chiefs of Police (IACP), several federal agencies and radio manufacturers have all participated in building this important standard.

Project 25 ensures that all systems following this standard will meet its five main objectives:

1. To make efficient use of the limited number of available public safety frequencies.
2. To permit interoperability among other Project 25-compliant agencies.
3. To ensure backward compatibility of the network.
4. To create smooth system migration via upgrades, additions, etc.
5. To provide the capability for scalable trunked and conventional networks.

3.2 CMICC Objectives

The vision of the Central Montana Interoperable Communications Consortium (CMICC) as set forth in the establishing Memorandum of Understanding, is to develop an interoperable P25 multimode radio communications system based on federal and state communication standards in which federal, state and local public safety and emergency management representatives can operate autonomously and transition seamlessly to communicate effectively in emergency

mission roles. Such a system will provide secure voice and data communications for public safety and improve homeland security through provision of the means by which military and civil authorities may communicate. It will also provide for backwards compatibility during its implementation. This vision will be carried out in three phases. Phase I is Capability Assessment and Implementation Strategy. Phase II is the Final Plan Development Phase. Phase III is plan implementation.

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4 Project Activities

4.1 Gathering of Jurisdiction Stakeholder Information

4.1.1 Description of Activity

For each of the six counties and the Chippewa Cree in the CMICC consortium, detailed communications-related information was gathered. Some of this information was gathered by the jurisdiction representatives sitting on the CMICC Board, some of it was gathered by employees of the radio shops used by the counties, and some by the Project Manager. This information includes:

- A list of relevant jurisdiction stakeholders. Jurisdiction stakeholders are those persons or agencies operating within the jurisdiction who have a stake in communications interoperability
- Questionnaires given to and filled out by jurisdiction stakeholders
- Physical surveys of all the existing radio sites in the jurisdiction
- Letter of support from the jurisdiction stakeholders

Other information gathering involved the review of other radio project reports such as the "Phoenix Fire Department Radio System Safety Project". The following is a link to the report:

http://www.ci.phoenix.az.us/FIRE/radioreport.pdf

This report has been referenced by many people in the fire discipline as it pertains directly to trunked digital radio operations for firefighters. Aspects of this report were utilized to ensure that the design of a new radio system accounted for the needs of the fire community.

As several other consortia have completed needs assessments at this point, each of the reports that were available were reviewed to help ensure completeness in this needs assessment.

4.1.2 Potential Candidate Stakeholder List

To aid in the creation of each jurisdiction's stakeholder list, the following potential stakeholder list was created. Please note that not all of the agencies and entities on this list will be applicable in all counties. The list was created simply to aid people in identifying those stakeholders of interest in their jurisdiction.

Jurisdiction Level – To Be Contacted By the Jurisdiction Representatives

1. Local Law Enforcement Agencies
   A. County Sheriffs
   B. City Police Departments
   C. Tribal Law Enforcement
2. Local Public Safety/Emergency Responders
   A. EMS (public and private)
   B. City Fire Departments
   C. Rural and/or Volunteer Fire Departments
   D. Search and Rescue Teams
   E. Airport Security
   F. Jurisdiction-level DES
3. Public Works
4. Juvenile Probation (District Courts)
5. Jurisdiction Public Health Reps.
6. Local Sanitarians
7. County Commissioners
8. Public Utilities (electricity, gas)
9. Broadcast Radio Stations
10. Coroner
11. Amateur Radio Operators
12. Railroad (remember Alberton Gorge and the Helena railroad explosion of 1989)
13. Civil Air Patrol (better to deal with these folks locally, or at most, regionally, as those who participate in local search and rescue are local, private pilots.)
14. Schools (remember Columbine)
15. Radio Shops
16. Agencies in bordering counties not in the CMICC.
17. Representatives from bordering states, as appropriate
18. BIA

Multi-County Level

1. Other interoperability radio consortiums, such as NTIC, Big Sky 11, and Lewis & Clark County.
2. District DES
3. Drug Task Forces
4. DUI Task Forces
5. Adult Parole & Probation Regional Administrators (Dept. of Corrections)

State Level

1. Montana Army National Guard (Military Affairs)

2. Montana State-level DES
3. Montana Department of Justice
   A. Highway Patrol
   B. Criminal Investigations Bureau
   C. Narcotics Investigation Bureau
   D. Fire Prevention & Investigations Bureau
   E. Gambling Investigations Bureau
4. Montana Department of Transportation (including District Administrator)
5. DPHHS Public Health
6. Montana Department of Fish, Wildlife and Parks
7. Montana Department of Corrections, including prison, juvenile parole, and adult parole and probation
8. Montana Department of Livestock
9. Montana Department of Environmental Quality

Multi-State Level

Example: Missouri River Drug Task Force

Federal/International Level

1. Customs
2. US DOT
3. Red Cross
4. DEA
5. INS
6. FBI
7. US Marshals Service
8. US Probation
9. BLM
10. Border Patrol
11. US Forest Service
12. US National Parks Service
13. FEMA
14. Canada

4.2 Jurisdiction Stakeholder Meetings

4.2.1 Description of Activity

As part of the *Needs Assessment* phase, the jurisdiction representatives, Project Director and Project Manager met face-to-face with as many of the jurisdiction stakeholders as was possible.

Sometimes the jurisdiction representatives met with the stakeholders without the Project Manager, and sometimes the Project Manager met with stakeholders without the jurisdiction representatives. However, there was at least one meeting held in each of the three counties that included the jurisdiction representative, Project Director and the Project Manager.

Prior to the meeting with the Project Manager, all identified jurisdiction stakeholders were given a questionnaire to fill out. These were to be, ideally, completed and returned to the jurisdiction representative before the meeting with the Project Manager. Sometimes this could be done and sometimes it was not, due to schedules and other duties.

During these meetings, stakeholders were asked to describe their most pressing issues. In addition, any questions they might have had concerning the questionnaire were raised and answered. Technical questions sometimes arose about radios, trunking, and P25 compatibility. These questions were answered to the best of the ability of those present.

Follow up meetings were held in each jurisdiction near the end of the project to present some of the findings, the design strategy and preliminary design, which included coverage maps.

4.2.2 Typical Initial Meeting Agenda

Each meeting in each jurisdiction was a little different from the others. In general, the Project Manager led the meeting, but allowed the participants to talk about the things they felt were important. In general, the meetings lasted from two to three hours, and very roughly followed this agenda:

Opening Remarks – Quick Review of CMICC Purpose & Goals .....10 minutes
Jurisdiction Representative

Welcome, Introductions .....10 minutes
Project Manager

Project Overview, P25 and Trunking.....40 minutes
Stakeholders

Comments, Issues, and Questions From Stakeholders (cont.) .....30 minutes
Stakeholders

Wrap Up: Next Steps, Homework, Action Items.....15 minutes
Project Manager

4.3 Materials Provided to Jurisdiction Representatives

4.3.1 Questionnaires

Questionnaires were provided to stakeholders throughout the consortium. Completed questionnaires are available in the appendix section.

4.3.2 Site Surveys

Site surveys were performed by local individuals in each jurisdiction. These surveys are cursory in nature and provide enough information to conduct the preliminary design. A detailed site survey will need to be conducted in the design phase of the project. This detailed survey will allow accurate estimates to be provided for improvement to power infrastructure, grounding, building capacity and tower capacity.

4.3.3 Letters of Support Template

Each primary jurisdiction and tribal contact was provided a template for a letter of support. This template was to be filled out by various agencies in an area to demonstrate support for the project. These letters are then intended to be used in grant proposals.

4.4 Preliminary Design

The preliminary design follows a strategic implementation plan devised based on factors that include coverage of near by sites, overall site condition and available funding. If existing sites with similar coverage footprints in better condition could be used, they were selected for improvements over sites that needed more work and ultimately money. The coverage needs of the local agencies were taken into account to fill in holes. Strategy on which sites to develop into trunked sites was based on population density, site coverage and microwave paths. Further details are provided further in the document.

The preliminary design is structured such that it follows the strategy adopted by the Project Directors for all consortia in the state.

4.5 Non-Jurisdiction Stakeholders

In addition to stakeholders within the counties, several state or federal stakeholders were contacted as well. It is believed that these stakeholders are also important to include in the process. In many emergencies, such as a forest of grassland fire, communication with these non-jurisdiction stakeholders is extremely critical.

Subscriber Units
There are still quite a few subscriber units listed in the "unknown" category. It is very possible that there are newer radios that do not need replacing in this category. That will ultimately save money.

Site Surveys
Completing site surveys at the engineering level is beyond the scope of the baseline needs assessment. Sites were surveyed for obvious problems and basic details. Where available, photos of each site are located on the CD that accompanies this report. Site assessment criteria will have to be developed during the implementation phase but would include some generally applicable and logical considerations:

1. Topography as it relates to transmission efficiency
2. Road access as it relates to equipment needed for site upgrade/improvement
3. Electric power requirements for upgraded sites
4. R-56 or other grounding standards
5. Microwave link capability
6. Screening potential of existing vegetation, structures and topographic features
7. Compatibility with adjacent land uses
8. The least number of sites to cover the desired area
9. The greatest amount of coverage, consistent with physical requirements
10. Opportunities to mitigate possible visual impact

Dispatch Centers
Dispatch centers will also require further investigation in regard to radio consoles and base station connectivity to the overall radio system. PSAPs and 911 centers were not part of this scope of work but will need to be integrated into the overall dispatch upgrade plan.

5.11 Contents of CD – Electronic Documents

- Electronic version of this document
- Radio Inventory Spreadsheet
- Infrastructure Preliminary Design Spreadsheet
- Site Surveys
- Motorola Coverage Maps – Images
- Motorola Coverage Maps – GIS Data
- Site Photos
- Meeting Notes
- Completed Questionnaires
- Project Statement of Work Document
- SIEC Interoperable Definition